Program for Optimal Raw Mix Design

1.   MIXOPT

1.1   OPTIMAL RAW MIX DESIGN ON PERSONAL COMPUTER

MIXOPT is a comprehensive program for the optimal design of raw mixes and determination of product characteristics. It is tailored to the specific needs of the cement industry and offers a wide range of applications in the field of raw meal preparation and product design:

- Up to 9 components may be included to determine a raw mix of desired characteristics.

- Fixed values or ranges may be set for chemical (e.g. Na_2O-equivalent) and mineralogical (e.g. C_3A) constraints of product characteristics.

- The component quantities can also be restricted. This might be necessary in case of limited availability or for fuel ash.

- Lowest cost product is determined within given product constraints if costs of components are entered

- Alternatively to cost optimisation, optimisation or minimisation of a particular chemical component is possible.

- Blending of materials or determination of raw meal, clinker and cement characteristics can be accomplished apart from raw mix optimisations.

- Program includes data base and print facilities.

Typical MIXOPT applications are illustrated on the following pages.

The knowledge required to operate the programs can quickly be acquired. Dialogue, window menu selection, and user's help facilities make it very user-friendly. Previous computer knowledge is not required.

The program or further information is provided by:

"Holderbank" Management and Consulting Ltd.,
Technical Centre Materials Division,
5113 Holderbank,
Switzerland

or

"Holderbank" Consulting Ltd.
2310 Lakeshore Road W.
Mississauga,
Ontario
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2.   PROGRAM FOR OPTIMAL RAW MIX DESIGN

2.1   FACILITIES

- BLENDING OF COMPONENTS

- DETERMINATION OF PRODUCT CHARACTERISTICS
  - Raw Max
  - Clinker
  - Cement

- ◆ RAW MIX DESIGN WITH UP TO 9 COMPONENTS
  - Fixed Value or Range for Product Constraints of:
  - Limitation of Component Concentrations
  - Input Specification such as:
  - Reference to Moist or Dry Components

- ◆ COST OPTIMISATION OF PRODUCT

- ◆ DATA BASE FACILITIES FOR:
  - Components
  - Product Constraints (e.g. for different clinker types)
  - Calculated Product

- ◆ PRINT FACILITIES
  - Single Mix Design
  - Compilation of Mixes

- ◆ GENERAL USER FACILITIES
  - Insertion and Copying Mode
  - Title Specification
  - File Clearing
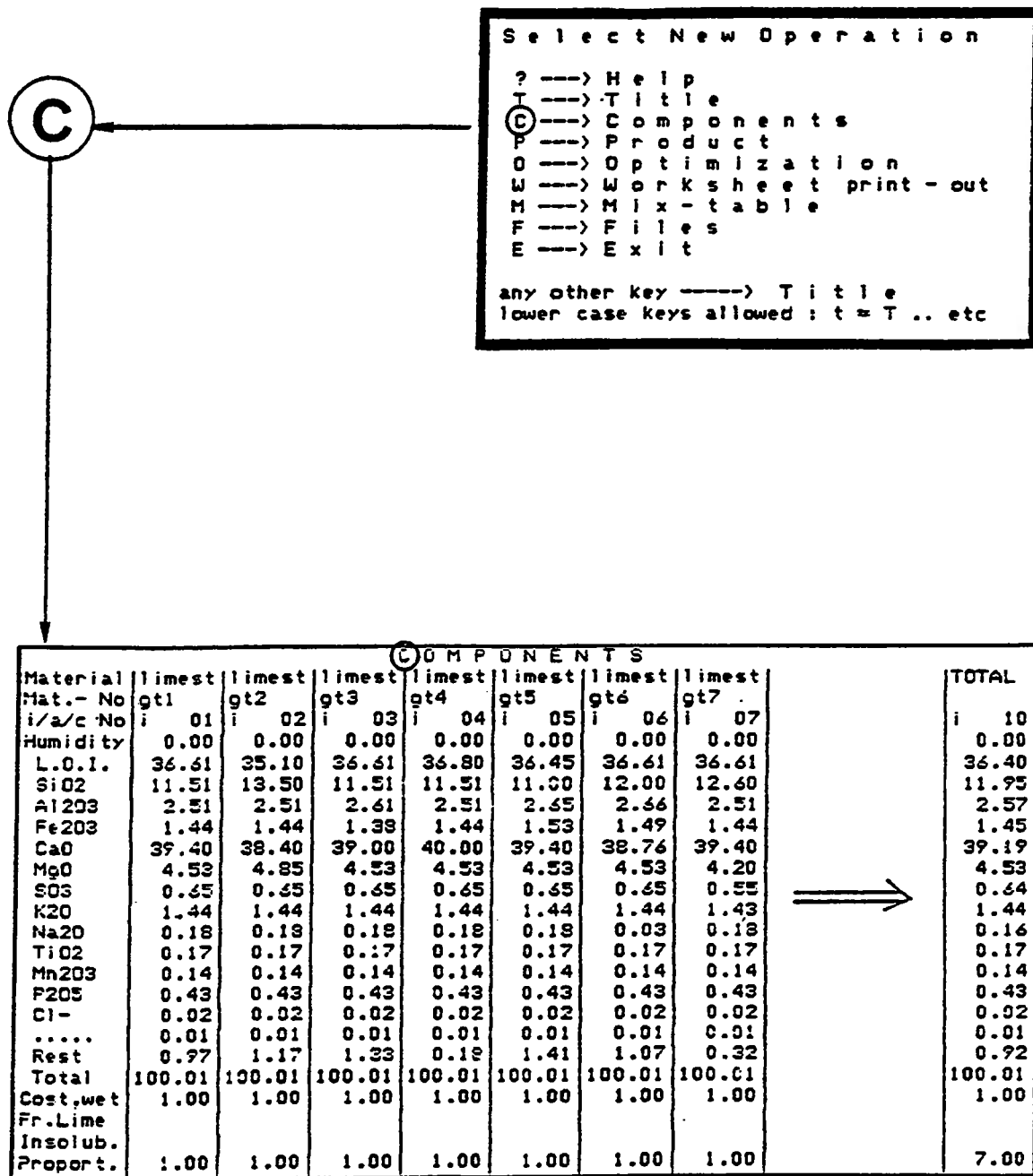 - Help

"HOLDERBANK"

Fig. 1   Blending of Components.


```
S e l e c t   N e w   O p e r a t i o n

?  --->  H e l p
T  --->  T i t l e
C  --->  C o m p o n e n t s
P  --->  P r o d u c t
O  --->  O p t i m i z a t i o n
W  --->  W o r k s h e e t   print - out
M  --->  M i x - t a b l e
F  --->  F i l e s
E  --->  E x i t


any other key  ----->  T i t l e
lower case keys allowed : t = T .. etc
```

C O M P O N E N T S

Material	limest	limest	limest	limest	limest	limest	limest		TOTAL
Mat.- No	gt1	gt2	gt3	gt4	gt5	gt6	gt7		
i/a/c No	i 01	i 02	i 03	i 04	i 05	i 06	i 07		i 10
Humidity	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00
L.O.I.	36.61	35.10	36.61	36.80	36.45	36.61	36.61		36.40
SiO2	11.51	13.50	11.51	11.51	11.00	12.00	12.60		11.95
Al2O3	2.51	2.51	2.61	2.51	2.65	2.66	2.51		2.57
Fe2O3	1.44	1.44	1.39	1.44	1.53	1.49	1.44		1.45
CaO	39.40	38.40	39.00	40.00	39.40	38.76	39.40		39.19
MgO	4.53	4.85	4.53	4.53	4.53	4.53	4.20		4.53
SO3	0.65	0.65	0.65	0.65	0.65	0.65	0.55		0.64
K2O	1.44	1.44	1.44	1.44	1.44	1.44	1.43		1.44
Na2O	0.18	0.18	0.18	0.18	0.18	0.03	0.18		0.16
TiO2	0.17	0.17	0.17	0.17	0.17	0.17	0.17		0.17
Mn2O3	0.14	0.14	0.14	0.14	0.14	0.14	0.14		0.14
P2O5	0.43	0.43	0.43	0.43	0.43	0.43	0.43		0.43
Cl-	0.02	0.02	0.02	0.02	0.02	0.02	0.02		0.02
.....	0.01	0.01	0.01	0.01	0.01	0.01	0.01		0.01
Rest	0.97	1.17	1.33	0.19	1.41	1.07	0.32		0.92
Total	100.01	100.01	100.01	100.01	100.01	100.01	100.01		100.01
Cost.wet	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00
Fr.Lime									
Insolub.									
Proport.	1.00	1.00	1.00	1.00	1.00	1.00	1.00		7.00

Fig. 2   Product Characteristics.

Fig. 3   Mix Optimisation.

```
Select New Operation

? ---> Help
T ---> Title
C ---> Components
P ---> Product
O ---> Optimization
W ---> Worksheet print - out
M ---> Mix - table
F ---> Files
E ---> Exit

any other key -----> Product
lower case keys allowed : t = T .. etc
```

Ⓟ R O D U C T

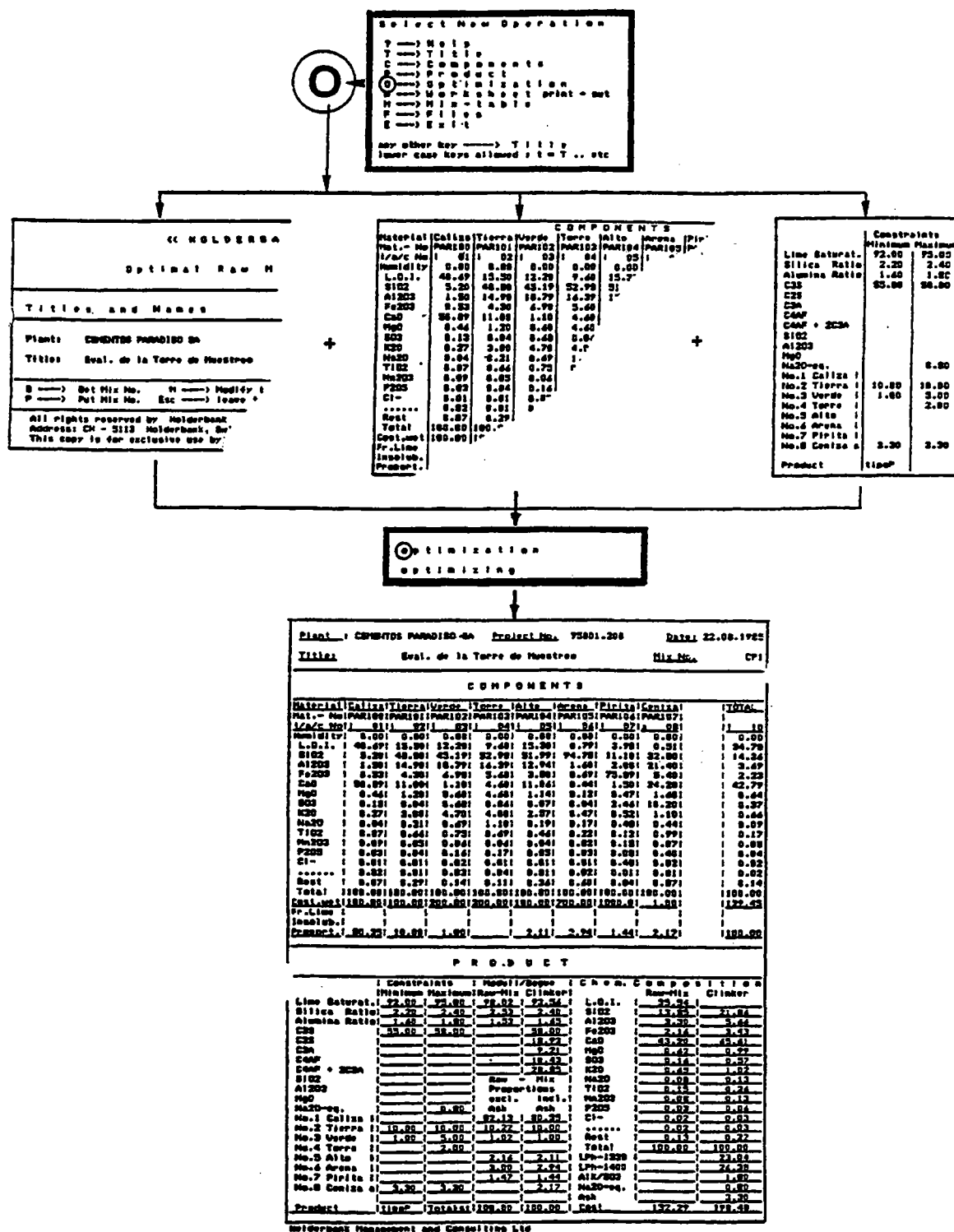|	Constraints Minimum Maximum	Moduli/Bogue Raw-Mix Clinker	Chem. Composition Raw-Mix	Clinker
Lime Saturat.		95.02	L.O.I.	0.05
Silica Ratio		2.83	SiO2	21.77
Alumina Ratio		1.89	Al2O3	5.03
C3S		55.50	Fe2O3	3.67
C2S		20.58	CaO	65.21
C3A		8.83	MgO	1.00
C4AF		8.12	SO3	2.90
C4AF + 2C3A		25.78	K2O	0.59
SiO2			Na2O	0.14
Al2O3		Proportions	TiO2	0.02
MgO			Mn2O3	0.03
Na2O-eq.			P2O5	0.02
No.1 tipol k		100.00	Cl-	0.01
			......	0.01
			Rest	0.56
			Total	100.00
			LPh-1338	18.00
			LPh-1400	22.45
			Alk/SO3	0.23
			Na2O-eq.	0.53
Product	Totals:	100.00	Cost	0.00

Fig. 4   Compilation of Results.

Fig. 5 Storage of Data, Constraints and Results.

```
Select New Operation

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M ---> Mix - table
F ---> Files
E ---> Exit

any other key -----> Product
lower case keys allowed : t = T .. etc
```

(F)

(F)iles
the following   77 files are available: 43 comp.,   8 prod.,   26 mix

10PART.CHM	58112.CHM	PAR105.CHM	ALTO14.MIX
15AREN.CHM	58113.CHM	PAR106.CHM	ALTO2.MIX
54530.CHM	58114.CHM	PAR107.CHM	ALTO3.MIX
57163.CHM	AL203.CHM	ALTO1.PRD	ALTO4.MIX
57164.CHM	CAL15.CHM	ALTO2.PRD	ALTO5.MIX
57165.CHM	CEMENT.CHM	ALTO3.PRD	ALTO6.MIX
57166.CHM	CLINKE.CHM	EMPTY.PRD	ALTO7.MIX
57167.CHM	GT1.CHM	START.PRD	ALTO8.MIX
.57694.CHM	GT2.CHM	TIPOP.PRD	ALTO9.MIX
57695.CHM	GT3.CHM	TIPOPAR.PRD	CEMENT.MIX
57696.CHM	GT4.CHM	TYPE1.PRD	CLINKE.MIX
57698.CHM	GT5.CHM	01.MIX	CP1.MIX
58102.CHM	GT6.CHM	775.MIX	GTM1.MIX
58104.CHM	M1.CHM	777.MIX	MI01.MIX
58106.CHM	MEZCLA.CHM	800.MIX	PP1.MIX
58107.CHM	PAR100.CHM	ALTO1.MIX	START.MIX
58108.CHM	PAR101.CHM	ALTO10.MIX	TORRE1.MIX
58109.CHM	PAR102.CHM	ALTO11.MIX	
58110.CHM	PAR103.CHM	ALTO12.MIX	
58111.CHM	PAR104.CHM	ALTO13.MIX	

move the cursor to a file. mark/unmark for deletion with '*'
to end operations on this screen press Esc